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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/531,129	07/26/2005	Alexander Gutsol	DXPZ-0034 / 07-0772D	4959
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EXAMINER NGUYEN, NGOC YEN M				
ART UNIT		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,129

Applicant(s)

GUTSOL ET AL.

Examiner

Ngoc-Yen M. Nguyen

Art Unit

1793

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 October 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 29, 2009 has been entered.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-5 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants are request to point out support by page and line numbers in the instant specification for "partially oxidizing insoluble organic compounds", "partial-oxidation products" as now required in the instant claim 1. Also, since claim 1 is now required "insoluble volatile organic compounds", there is clear support in the instant

specification for "about 60 to about 6000 ppm VOC" of insoluble volatile organic compounds as now required in instant claim 4".

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over S. Masuda et al., "Novel Plasma Chemical Technologies-PPCP and SPCP for Control of Gaseous Pollutants and Air Toxics", Journal of Electrostatics, Vol. 34, No. 4, May 1995, pp. 415-438, optionally in view of Schiffner (5,861,123) and Makin et al (4,181,675).

Masuda et al disclose a pulse corona induced plasma chemical process (PPCP) for control of gaseous pollutants (NO_x , SO_x , VOCs) and air toxics as well as odors (note abstract). PPCP uses nanosecond pulse coronas in a corona reactor in combination with a nanosecond high-voltage pulse power supply with pulse frequency of 50-250 Hz (0.05-.25 kHz) (note page 416, third full paragraph from bottom).

The great advantages of PPCP are it is very simple in construction and their overall cost, both initial and running, is one of the lowest among many other processes.

For PPCP, there are several aspects to be carefully considered, one of which is the removal of the reaction products from the gas phase to avoid the reverse reaction.

This can be a water film formed on the reactor wall to absorb the reaction products (note item (4)(d) on page 419).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide a water film on the reactor wall for the process of Masuda et al to promote the removal the reaction products. For the actual ratio of the water flow to the gas flow, it would have been obvious to one skill in the art to optimize such ratio to obtain the highest destruction and removal efficiency.

Optionally, Schiffner '123 can be applied to teach the need to remove trace amounts of methanol from pulp mill bleach plant emissions (note column 10, lines 34-37). The "trace amount" fairly suggests that the amount of methanol in the emissions is low, i.e. in ppm range, as required in the instant claims 4, 8, 11.

Optionally, Makin '675 can be applied to teach that methanol vapor, i.e. methanol in a gaseous stream, can be removed by scrubbing with water (note column 2, lines 31-34).

It would have been obvious to use the process of Masuda et al to remove methanol, which is a VOC, as suggested by Schiffner '123 the in presence of a water film because such water film would facilitate the removal of methanol as suggested by Makin '675.

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sobacchi et al, "Experimental assessment of non-thermal plasma techniques for removal of paper industry VOC emissions", 15th International Symposium on Plasma Chemistry, Orleans, July 9-13, 2001. Symposium Proceedings, Vol. VII: poster contributions, pp. 3135-3140) (taken from <http://plasma.mem.drexel.edu/publications/>), optionally further in view of Makin '675.

It should be noted that the Sobacchi is available as a reference under 35 USC, 102(b) for all claims because there is no support for the following limitations in the provisional application 60/367231, therefore, the earliest effective filing date for all claims is the filing date of the PCT/US03/09089, i.e. March 24, 2003. The following limitations are examples of limitations that do not have support in the provisional application:

- "influent" in claim;
- "*about* 0.01 to *about* 2 kHz" (no support for the "about" limitation) in claims 1, 6, 10;
- "0.1 to about 1 kHz" in claims 3, 6 and 10;
- "about 60 to about 6000 ppm VOC" in claims 4 and 6;
- " about 40°C to about 65°C" in claims 7 and 10;
- "about 4200 VOC" in claims 8 and 10;
- "300 to about 3000 ppm VOC" in claim 11;
- "about 99 percent *or more*" in claim 12, same reason as stated above or "or more";

- "oriented strandboard production" in claim 13.

Sobacchi discloses a process using non-thermal plasma techniques for treating of volatile organic compounds (VOCs) emissions from the paper industry (note abstract). The gas compositions are listed in Table 1. The amounts of VOCs listed in Table 1 overlaps the claimed ranges. With respect to the encompassing and overlapping ranges previously discussed, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of invention to select the portion of the prior art's range which is within the range of the applicants' claims because it has been held prima facie case of obviousness to select a value in a known range by optimization for the results. *In re Boesch*, 205 USPQ 215. Additionally, the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time invention was made to have selected the overlapping portion of the range disclosed by the reference because overlapping ranges have been held to be a prima facie case of obviousness. *In re Malagari*, 182 USPQ 549.

In the experiments, pulse frequency was varied between 266 Hz and 1450 Hz (0.266 to 1.45 kHz). A water flow rate equal to 0.25 ml/min was provided and the gas flow rate was 2 SLM (note third page of the article, first full paragraph).

In Sobacchi, when the VOCs include insoluble volatile organic compounds such as dimethyl sulfide and pinene, such compounds would inherently be partially oxidized when subjected to the similar pulsed corona discharges.

The temperature can be from 70-200°C (note page 4 of the article, last paragraph). The target objective of 99% removal can be reached (note page 3 of the article, second full paragraph).

Sobacchi discloses that corona discharge allows for achieving high values of Destruction and Removal Efficiency (DRE), with much lower power consumption (note last page of the article, first full paragraph).

The ratio of the water spray to the exhaust gas flow is $0.25/2 = 0.125$ ml/min. This value is very close to the claimed value of "about 0.2 ml/min", therefore, no patentable difference is seen. Furthermore, the value of "0.125" would have suggested to one of ordinary skill in the art a slightly higher value based upon a reasonable expectation of success, *In re O'Farrell*, 853 F.2d 894, 904, 7 USPQ2d 1673, 1681 (Fed. Cir. 1988).

It would have been obvious to one of ordinary skill in the art to optimize the process conditions in Sobacchi, such as water flow rate, temperature, pulse frequency, etc. to obtain the highest removal rate at lowest power consumption.

Optionally, Makin '675 can be applied as stated above to teach that the presence of water spray would further facilitate the removal of methanol by scrubbing action.

Applicant's arguments filed October 29, 2009 have been fully considered but they are not persuasive.

Applicants argue that Masuda discloses the full oxidation, or burning, of gaseous pollutants.

It is unclear whether or not Masuda discloses the full oxidation of the gaseous pollutants as argued by Applicants, Masuda, however, is no longer applied against claims 1-5 because Masuda does not disclose that the VOCs are "insoluble" as now required in Applicants' claims.

Applicants argue that Masuda provides no empirical evidence or data showing the effect of water and provides no empirical evidence showing the ratio of water to gas, in combination with a plasma having certain electrical characteristics, necessary to prevent the reverse reaction and to remove the products of the reaction.

In Masuda, the pulse corona induced plasma chemical process (PPCP) is used to decompose the pollutant molecules (note item 1 on page 418) and the water film is to remove the reaction products (note item 4 (d) on page 419). These two steps can be independently controlled to achieve the desired results.

Applicants argue that the water in Masuda is not an influent stream but is a reaction byproduct of the chemical processes creating the reaction products in the reactor.

There is no clear disclosure in Masuda to support Applicants' allegation that the water film is a reaction byproduct. It appears that "the water film *formed* on the reactor wall" as disclosed in item (4) (note page 419) can be formed by any method, i.e. forming in-situ by producing water as the reaction by-product or introducing fresh water from outside source, as long as a water film is formed to absorb the reaction products.

Applicants argue that if certain specific conditions are not met, no water film will be formed.

If no water film, as reaction byproduct, will be formed, it would have been obvious to one skilled in the art to creating the water film by other means, such as introducing fresh water, so that the water film can absorb the reaction products as required in Masuda.

Applicants argue that when Masuda discloses the introduction of material into the reaction, Masuda uses introduce, add, or additive or other similar terminology that specifically reflects the source, but Masuda specifically used the term "formed", which would fit within technical aspect of Masuda, as the reaction of certain VOCs or other gases may produce water as a reaction product.

This argument is not persuasive because whether or not water is formed as a reaction product, Masuda still teaches that a water film is used to absorb the reaction products, thus, if the water is not formed or the water is formed but not enough to absorb the reaction products, it would have been obvious to one of ordinary skill in the art to further add water to effectively absorb the reaction products as desired in Masuda. As for the term "formed", if such term clearly indicates that the water is formed by the reaction of certain VOCs, then as disclosed in step c), gas-"borne" particles of dust or mist must also be formed by the reaction of certain VOCs because Masuda does not use introduce, add, etc. ?

Applicants argue that Masuda explicitly discloses that the water used is to be a water film formed as a result of the reaction.

As stated above, there is no explicit disclosure in Masuda to support Applicants' allegation that the water film is formed as a result of the reaction.

Applicants again argue that Masuda is disclosing full oxidation rather than partial oxidation.

Masuda is not applied against Applicants' claims 1-5 which require partial oxidation of insoluble VOCs.

Applicants argue that the process of Makin does not use plasma nor does it disclose the recitation of passing an exhaust gas through a pulse corona discharge chamber in the presence of the influent spray of water droplets or water film.

Makin can be optionally applied to teach that a water scrubber can be used to remove methanol instead of a water film. Makin is not relied upon to teach the use of a plasma or corona discharge. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Applicants argue that the use of water as disclosed by Sobacchi was to simulate the humidity of exhaust gases in pulp mills and because it was injected into a reactor operating at 220°C, all the water would have evaporated, and thus, no water film or droplets would be present to absorb the partially reduced VOCs, as required in Applicants' claim 1.

In Sobacchi, it is clearly disclosed that "[B]oth corona and gliding arc reactors were designed to allow water injection, in order to study a synergetic effect of plasma chemistry and absorption into water on the VOCs removal" (note page 2, first full

paragraph). It would have been obvious to one skilled in the art to optimize the amount of water used in the process of Sobacchi using corona discharge application to provide absorption, not just to merely simulate the humidity of exhaust gases in pulp mills. Even if the use of water is indeed was to simulate the humidity of exhaust gases, Sobacchi still teaches that the DRE (Destruction and Removal Efficiency) value appears to be dependent of different parameters, such as power input, VOC concentration, humidity of the inlet gas stream, a temperature of the corona reactor (note page 2, last paragraph). It would have been obvious to one skilled in the art to optimize the amount of water used in order to optimize the humidity of the inlet gas stream to obtain the best DRE value. As for the temperature of corona reactor, even if it was operated at 220°C, the amount of water vaporized would depend on the residence of the water in the reactor, not all the water would instantaneously vaporized at 220°C. Again, it would have been obvious to one skilled in the art to optimize the reaction temperature (from 70-220°C, note page 4, last paragraph) to obtain the desired results. It should be noted that at lower temperature, the water would not be vaporized as argued by Applicants and Applicants' claims do not require any DRE value or any reaction rate.

The rejections of claims 6 and 10 and the dependent claims are maintained for the same reasons as stated above and because Applicants' arguments regarding "partial oxidation" are not applicable to claims 6, 10 which do not require the VOCs to be insoluble and do not require the "partial oxidation".

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ngoc-Yen M. Nguyen/
Primary Examiner, Art Unit 1793

nmn
January 7, 2010